

Case Report

An autopsy case of renal candidiasis

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Abstract

Systemic candidiasis is the most frequently encountered opportunistic fungal infection, the kidneys being primarily affected in 80% of the cases. Most of the cases are fatal, diagnosed either very late for effective therapeutic intervention or are documented only at post-mortem examination. We, herein, report a case of renal candidiasis in an elderly male who died in the hospital while undergoing treatment for head injury and multiple fractures sustained following a road traffic incident. Renal candidiasis with fungal balls obstructing the pelvicalyceal system was diagnosed at autopsy, which may have contributed to death.

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1. Introduction

Invasive candidiasis is a severe life threatening infection with a mortality rate as high as 80%.¹ Renal involvement with bilateral ureteral obstruction by fungal balls is rare.^{2,3} Antemortem diagnosis is difficult as the clinical and radiological features are non-specific and laboratory investigations may not reveal any significant finding.⁴ Moreover, the symptoms may be masked by other diseases. We, herein, describe a 63-year-old male who died after four

months of hospital stay while undergoing treatment for head injury and multiple fractures sustained following a road traffic incident. At autopsy, he was found to have renal candidiasis with fungal balls obstructing the collecting system which may have contributed to death.

2. Case report

A 63-year-old non-diabetic and non-hypertensive male was admitted to the intensive care unit with head injury and multiple fractures sustained following a road traffic incident. At the time of admission, he was unconscious with a Glasgow coma scale of 6/15. Pupils were mid-dilated

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and sluggishly reacting to light. The right femur, right radius and right ulna were fractured. The computed tomography (CT) scan of the head showed diffuse cerebral oedema and interhemispheric haemorrhage. There was obliteration of perimesencephalic cisterns with mass effect of brain stem transtentorial herniation. Bilateral superior frontal, right temporal and left frontal subcalvarial contusions with bilateral ethmoid and maxillary haemosinuses were seen. The laboratory investigations were within normal limits. The patient was intubated and placed on ventilator. Later tracheostomy was performed. Corrective surgeries were done for the various fractures sustained. After a month he was shifted to the surgical ward. His hospital stay continued for four months after which he expired.

At autopsy, the body was that of a moderately nourished and moderately built male weighing 50 kg and measuring 167 cm in length. The body was cold and stiff. Postmortem lividity present on the back of the trunk was not fixed. Pressure sores were present in the sacral and gluteal regions. On internal examination, both the right and left kidneys were enlarged, each measuring 12 cm × 5.5 cm × 3.5 cm. The right and left kidneys weighed 250 and 220 g, respectively. Grossly, the outer surface of both the kidneys had perirenal pad of fat with attached capsule. Cut surfaces showed multiple grayish white irregular patchy areas involving the cortex and medulla (Fig. 1). Brownish necrotic and friable material was present in the renal pelvis producing a pelvicalyceal ‘cast’. Papillary necrosis was also seen within the renal pyramids. On light microscopy, the entire renal cortex and medulla showed extensive areas of necrosis. There were multiple microabscesses in the renal parenchyma. Numerous weakly basophilic fungal organisms were seen amidst the necrotic debris as a mixture of spherical to ovoid yeast-like budding cells with pseudohyphae (Fig. 2a and b). Thrombotic occlusion of the blood vessels and radiating microcolonies of *Candida* species were found in the interstitium and tubules. The friable material



Fig. 1. Cut surface of the kidney showing grayish white irregular areas involving the entire renal cortex and medulla.

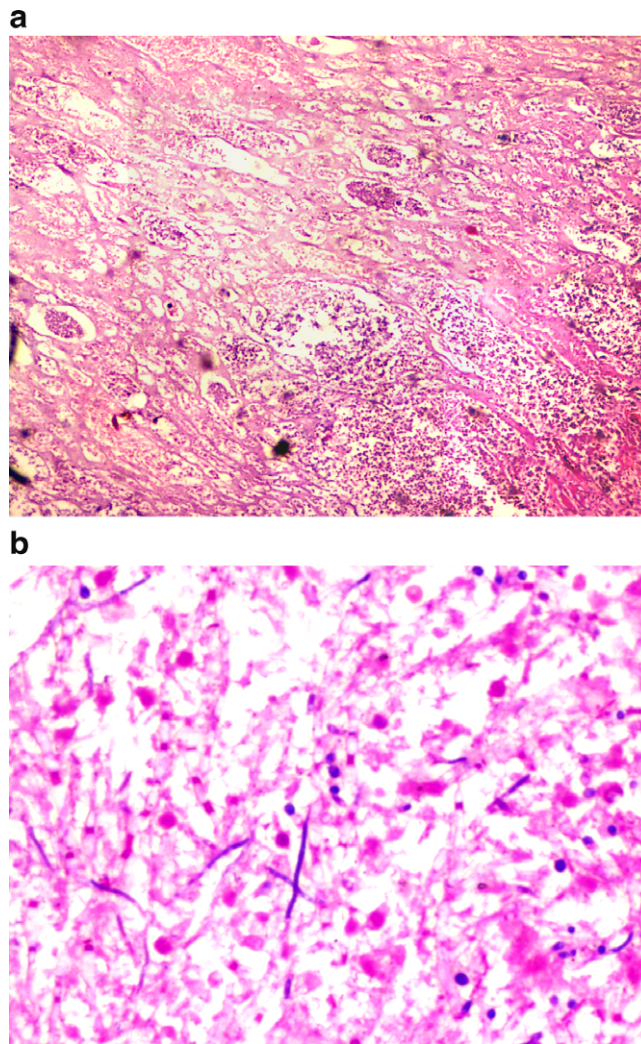


Fig. 2. (a) Multiple microabscesses in the renal parenchyma along with numerous weakly basophilic fungal organisms amidst the necrotic debris (Haematoxylin and Eosin 200×) and at higher magnification in (b) (Gram's stain 400×).

in the renal pelvis consisted of masses of proliferating candidal mycelium containing haphazardly arranged hyphae, pseudohyphae and blastoconidia forming the so-called ‘fungal balls’ (Fig. 3). Necrotic papillae contained masses of fungal elements. Periodic acid-Schiff stain and Gram's stain highlighted the yeast-like budding cells with pseudohyphae (Fig. 4a and b). The patient was diagnosed to have bilateral renal candidiasis. Liver that weighed 1100 g showed many micro and macronodules of varying sizes from 0.1 mm to 0.4 mm. On microscopy, there were features of cirrhosis with loss of parenchymal architecture. Collagenous fibrous septae were seen joining portal tracts to portal tracts and portal tracts to terminal hepatic veins with the entrapped parenchymal hepatocytes forming the regenerative nodules. The fibrous septae were infiltrated by chronic inflammatory cells which were seen to spill over the adjacent parenchymal nodules. Lungs appeared normal grossly. On microscopy, there were focal areas of intersti-

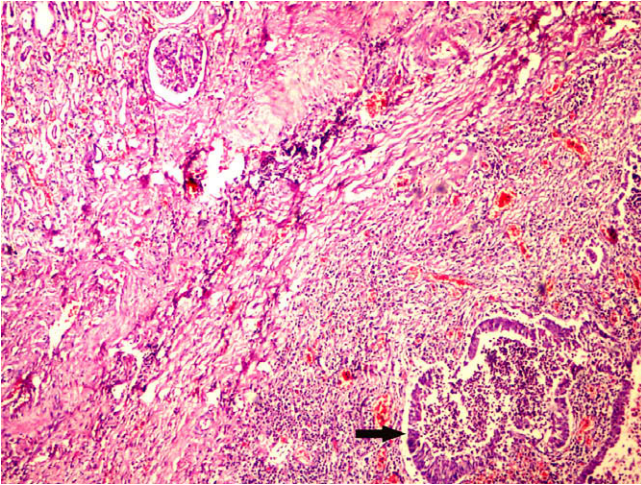


Fig. 3. Proliferating candidal spores and pseudohyphae forming the so-called 'fungal balls' (arrow) admixed with the necrotic debris in the renal pelvis (Haematoxylin and Eosin 200 \times).

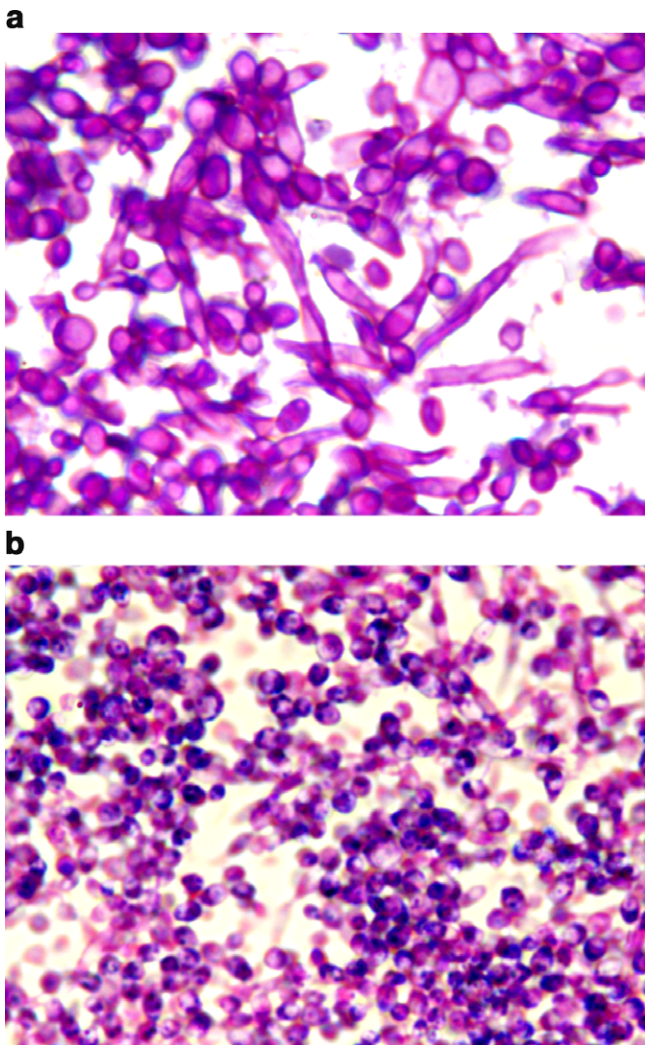


Fig. 4. Periodic acid-Schiff stain and Gram's stain highlighting the yeast-like budding cells with pseudohyphae in (a) and (b), respectively, (original magnification 1000 \times).

tial fibrosis and some alveoli showed dense collection of macrophages. The congested and oedematous brain weighed 1350 g. Bilateral uncus and tonsillar coning were evident. Focal areas of softening were present in the right and left frontal lobes, right temporal lobe and the brainstem. The stomach, intestines, spleen, adrenals, prostate and urinary bladder appeared unremarkable grossly and microscopically. The cause of death was opined as complications of head injury sustained due to blunt force impact to the head from a road traffic incident. Renal candidiasis was considered as a contributory cause of death.

3. Discussion

Sporadic cases of systemic and renal candidiasis in autopsy series are reported in recent years.⁴ This may be attributed to greater survival of patients with malignancies, chronic diseases, increasing number of transplants and complex surgical procedures. The most common species affecting humans is *Candida albicans*, the others being *Candida tropicalis* and *Candida parapsilosis* associated with poorer prognosis.

Disseminated candidiasis may be the result of gastrointestinal, urinary or respiratory involvement with gastrointestinal tract being the primary portal of entry.⁵ Kidney is primarily affected in 80% of cases followed by brain and heart.⁶ The blastoconidia circulating through the renal vasculature, get attached to the glomerular and peritubular capillary endothelium and penetrate the vessel wall into the renal parenchyma and tubules by germination or by formation of pseudohyphae. After entering the tubules, the fungal aggregates are excreted into the collecting system and either attaches to the papillae, become trapped in the renal pelvis or are excreted in the urine. Immunocompromised patients are more commonly affected and are usually secondary to diabetes mellitus, human immunodeficiency virus infection, malignancies or long term antibiotics, steroids or immunosuppressive drugs. Multiple antibiotics in patients of acute renal failure on dialysis is found to be associated with colonization and translocation of candida from gastrointestinal tract to blood and cause candidemia directly or through catheter contamination.⁷ The commonly recognized first site of candidal infection is urine, airway or blood, followed by skin.⁵

Renal candidiasis may be unilateral causing pyelonephritis, abscess formation, papillary necrosis, lower urinary tract infection and obstruction.⁶ Bilateral ureteral obstructions resulting in death is rare. The patient usually presents with flank pain and renal colic caused by passage of fungal balls in the urine. In few cases primary renal candidiasis occurs when the fungal colonies in the lower urinary tract gain passage into the kidney by vesicoureteric or intrarenal reflux. It manifests as accumulation of fungal material in the renal pelvis and renal papillary necrosis. In late stages, large fungal accretions develop that cause obstruction of the renal collecting system, pelvis, ureter and bladder.

In the present case, the renal involvement may have occurred in the ascending fashion from the lower urinary tract. The severe illness, prolonged antibiotic therapy, intravenous catheters, total parenteral nutrition, Foley catheter and the surgical procedures may have facilitated the occurrence. Renal candidiasis was asymptomatic and was not diagnosed until the postmortem examination. Ultimately the proliferating fungal spores and pseudohyphae forming the 'fungus balls' have resulted in intrarenal and ureteral obstructive uropathy and contributed to death.

The differential diagnosis of *Candida* species on tissue biopsy include *Sporothrix schenckii*, *Blastomyces dermatitis*, *Cryptococcus neoformans*, *Torulopsis glabrata* and *Histoplasma capsulatum* which are yeast-like but rarely produce hyphae. *Trichosporon* produces yeast-like cells and mycelium but yeast forms are larger and more pleomorphic and accompanied by rectangular arthroconidia.

Laboratory diagnosis of renal candidiasis is difficult as candida is part of normal human microflora and urine culture may be inconclusive. Identification of fungi in urine along with blood culture suggests disseminated candidiasis with renal involvement but blood culture is positive in only 40–50% of patients.⁸ The only conclusive evidence of renal candidiasis is histopathological demonstration of parenchymal invasion. The imaging studies like cystography, intravenous pyelography and CT scan show fungal accretion images as a mass lesion, documenting the obstructive uropathy and soft tissue density in renal collecting system.⁹ Percutaneous nephrostomy can demonstrate the filling defect and provides access for collection of material for microscopic study or culture, drainage and access percutaneous removal of fungal lesion. Survival depends on early diagnosis and treatment and the control or reversal of the underlying factors that have permitted fungal invasion. Treatment includes surgical intervention with systemic antifungal therapy.

To conclude, due to the prevalence of renal candidiasis at autopsy and the difficulty in antemortem diagnosis, a more aggressive diagnostic approach is warranted. It is especially important in immunocompromised patients where the clinical manifestation may be masked by the underlying diseases. Tissue biopsy, blood culture and sero-

logical tests in addition to standard fungal tests of the body fluids are recommended even at the slightest suspicion. Early diagnosis and treatment may be associated with a favourable outcome.

Conflict of interest

The authors have no conflict of interest to declare.

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Ethical approval

Not applicable.

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